UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F.K. FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

MEMORANDUM

DATE: April 4, 1996

SUBJ: Final Ground Water Use and Value Determination Guidance

FROM: Linda M. Murphy
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TO: Superfund Staff
Ecosystem State Managers
Groundwater Coordinators

Attached to this memo is the Final Ground Water Use and Value Determination Guidance. This guidance combines the goals of two major regional initiatives, the Superfund Brownfields/ Beneficial Reuse Initiative and the Comprehensive Ground Water Protection Strategy. As part of the Superfund Brownfields/ Beneficial Reuse Initiative, this guidance is intended to result in more informed and focused decision-making and more common-sense, cost-effective ground water cleanups which will facilitate the beneficial reuse of contaminated parcels. To accomplish these objectives, this guidance incorporates the resource-based considerations used in EPA's Comprehensive Ground Water Protection Strategy. Specifically, this guidance document establishes an approach for determining the relative "use" and "value" of site ground water resources and explains how this determination affects EPA-New England's ground water remedial decision making process.

The guidance is a good example of how EPA intends to provide more flexibility to the states. The six New England States have provided comments on this guidance and support the process and concepts contained within.

The guidance shall be applied to all current and future sites in the pre-remedial or RI/FS pipeline, to the extent possible. If you have any questions on how this guidance should be applied, please contact any one of the following:

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GROUNDWATER USE AND VALUE DETERMINATION GUIDANCE

A RESOUCE-BASED APPROACH TO DECISION MAKING

Developed in cooperation with the

Comprehensive Groundwater Protection Strategy

Superfund Initiative

EPA
Region 1, New England

FINAL DRAFT
April 3, 1996

GROUND WATER USE AND VALUE DETERMINATION GUIDANCE
A Resource Based Approach To Remedial Decision Making

I. INTRODUCTION

This guidance combines the goals of two major regional initiatives, the Superfund Beneficial Reuse Initiative and the Comprehensive Ground Water Protection Strategy. As part of the Superfund Beneficial Reuse Initiative, this guidance is intended to result in more informed and focused decision-making and more common-sense, cost-effective ground water cleanups which will facilitate the beneficial reuse of contaminated parcels. To accomplish these objectives, this guidance incorporates the resource-based considerations used in EPA's Comprehensive Ground Water Protection Strategy. Specifically, this guidance document establishes an approach for determining the relative "use" and "value" of site ground water resources and explains how this determination affects EPA-New England's ground water remedial decision making process.

II. OVERVIEW OF NEW APPROACH

The new Approach to Superfund ground water decision making will be as follows:

* The Approach will be implemented in States with EPA-endorsed Comprehensive State Ground Water Protection Programs or CSGWPPs, but only where such States have entered into a Memorandum of Agreement with EPA-New England concerning the implementation of the Approach;

* EPA-New England will no longer rely on the 1986 Draft EPA Guidelines for Ground Water Classification in setting goals for ground water remediation and in making decisions on the level of cleanup necessary;

* Instead, a site specific determination will be made on the relative "use" and "value" of the ground water. States will play a pivotal role in determining the relative "use" and "value" of site ground water and will seek input from local officials and the public, as appropriate;

* EPA-New England will utilize the Use and Value Determinations performed by the States, in establishing remedial action objectives and making ground water remedial action decisions.

III. USE OF THIS GUIDANCE

The Approach provided in this guidance will be considered at current and future sites in the pre-remedial or RI/FS stages, to the extent possible. This guidance is for use by EPA-New England and State Remedial Project Managers in scoping Remedial Investigations, conducting Risk Assessments, developing Remedial Action Objectives and identifying Remedial Alternatives. EPA-New England does not intend to re-open remedy selection decisions based on this guidance. This guidance is for internal Agency use and contains no right, substantive or procedural, for any party.

IV. REGULATORY FRAMEWORK

A. NCP REGULATORY REQUIREMENTS: EXPECTATIONS FOR GROUND WATER

Under CERCLA and the 1990 National Contingency Plan (NCP), EPA is directed to meet certain expectations in addressing ground water contamination. Under the NCP regulations, EPA is expected to return:

- usable ground waters
- to their beneficial uses
- wherever practicable
- within a time frame that is reasonable,
- given the circumstances of the site.

When restoration of the ground water to beneficial uses is not practicable, EPA expects to prevent further migration of the plume, prevent exposure to contaminated ground water, and evaluate further risk reduction. 40 C.F.R. § 300.430(a)(1)(iii)(F).

B. USE OF THE 1986 DRAFT GUIDELINES FOR GROUND WATER CLASSIFICATION

The preamble to the 1990 NCP provides guidance as to how the expectation contained in the regulation should be achieved. As a guide to determining how to restore ground water to its beneficial uses, the NCP preamble states that EPA should assess the characteristics of ground water. To do this, the preamble to the NCP states that EPA should determine whether to classify the ground water as Class I, II or III. Guidance to make this determination is contained in the 1986 Draft Guidelines for Ground Water Classification. The preamble states that the 1986 Draft Guidelines are to be used as guidance to set goals for ground water remediation and to help make decisions on the level of cleanup necessary. However, as the preamble notes, these guidelines are not to be used as strict requirements, and should not be considered applicable, or relevant and appropriate requirements (ARARs).

The preamble to the NCP states that, for Class I and II ground waters[1], preliminary remediation goals should be generally set at MCLs and non-zero MCLGs. EPA's preference is for rapid restoration, when practicable, of Class I ground waters and contaminated ground waters that are currently, or likely in the near-term to be, the source of a drinking water supply. The NCP preamble further states that drinking water standards "will not be used" to determine preliminary

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[1]Class I ground waters were defined in the 1986 Draft Guidelines as ground waters of high value which are (I) irreplaceable sources of drinking water and/or (ii) ecologically vital. Class II ground waters were defined as current and potential sources of drinking water and water having other beneficial uses.

remediation goals for Class III ground waters[2]. Finally, the NCP also states that EPA will make use of state classifications when determining appropriate remediation approaches for ground water, unless it would lead to a less stringent solution than the EPA classification.

C. COMPREHENSIVE STATE GROUND WATER PROTECTION PROGRAM

Shortly after the NCP was promulgated in 1990, EPA undertook a new direction in its policies regarding ground water protection. In December 1992, EPA issued the Final Comprehensive State Ground Water Protection Program Guidance (CSGWPP), establishing principles and elements for a comprehensive ground water protection program. Under CSGWPP, EPA set out a three-tiered hierarchy of ground water protection goals:

- Prevention of contamination whenever possible;
- Prevention of contamination based on relative vulnerability of the resource, and where necessary, the ground water's use and value; and,
- Remediation based on relative use and value of ground water. The goal is to remediate all aquifers to meet their designated uses.

CSGWPP says that EPA and the States should take a realistic approach to restoration of contaminated ground water. The remedial response should be based on the actual and reasonably expected use of the resource, as well as social and economic values. CSGWPP acknowledges that the States' role is critical in understanding ground water resources. EPA, other federal agencies, and the states must work together to ensure consistent approaches to cleanup objectives.

Recognizing the states' critical role, the Comprehensive Ground Water Protection Strategy calls for states to develop Comprehensive Ground Water Protection Programs (CSGWPPs) consistent with the three-tiered hierarchy of ground water protection goals. These programs must be endorsed by EPA, and form the basis upon which EPA shall negotiate with the states for greater flexibility to effectively manage their ground water resource. To date, three New England states have EPA-endorsed Comprehensive Ground Water Protection Programs: Connecticut, New Hampshire and Massachusetts. The remaining New England states are in various stages of program development and endorsement, with anticipated endorsement of all six New England states by October 1996.

The Comprehensive Ground Water Protection Strategy also calls for Regions to improve cross-program coordination and integration in support of a State-directed, resource-based approach to ground water management. In November 1994, EPA-New England released its Comprehensive Ground Water Protection Strategy Implementation Plan. This plan included Action Plans for over 16 ground water-related EPA programs which identified creative new ways of doing "Ground Water Business" at the program operation level. As relevant here, Action Items identified for the Superfund Program included: 1) supporting integration of federal and state remediation programs

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[2]Class III ground waters were defined in the 1986 Draft Guidelines as ground water that is unsuitable for human consumption because of salinity or widespread contamination from multiple sources.

under one comprehensive strategy; and 2) developing a consistent ground water remedial decision-making process based on the relative "use" and "value" of the resource.

On July 14, 1995, EPA headquarters issued a memorandum affirming its commitment to apply the principles provided in CSGWPP to Superfund ground water decision-making in those States with EPA-endorsed CSGWPPs. The Office of Solid Waste and Emergency Response (OSWER) also intends to issue guidance concerning the use of CSGWPPs in Superfund remedial decision making. This regional guidance represents EPA-New England's approach to ground water decision making in states with EPA-endorsed CSGWPPs, based on the relative "use" and "value" of the resource.

IV. GROUND WATER USE AND VALUE DETERMINATION - A RESOURCE-BASED APPROACH TO REMEDIAL DECISION-MAKING

A. GENERAL PRINCIPLES

The principles of this resource-based Approach to ground water remedial decision-making reflect many of the Strategic Directions of EPA-New England, including the following:

- **Targeted and prioritized** remediation activities in high risk areas (e.g. Wellhead Protection Areas, Drinking Water Supplies);
- **Integration** of federal and state prevention and remediation programs under one comprehensive strategy minimizing inconsistencies and inefficiencies;
- **Empowering States** in a pivotal role for ground water management, with consistent decision making based on relative "use" and "value" of the resource;
- **Clarification of roles** for federal, state and local governments as **partners** in ground water management;
- **Improved public understanding and involvement** in community-based ground water decision-making; and,
- **Common-sense remediation decisions**, with ground water restoration strategies based on clear and informed information about the site-specific resource needs.

B. IMPLEMENTATION

1. EPA-New England Will No Longer Rely on 1986 Draft Federal Ground Water Classification Guidelines

Under this resource-based Approach, EPA-New England will no longer rely on the 1986 Draft Guidelines for Ground Water Classification in setting goals for ground water remediation and in making decisions on the level of cleanup necessary. Instead, EPA will rely on the resource-based Approach to ground water evaluation taken in CSGWPP. Specifically, EPA's ground water remedial decision making process will be based on the relative "use" and "value" of the ground water resource as described below.

2. Assessing the Use and Value of the Contaminated Aquifer

EPA-New England has developed an eight factor analysis to encourage a consistent approach across all New England states. Many of these factors were obtained from the state classification systems currently in place and are considered by EPA as critical factors for site specific ground water use and value determinations. EPA considered simply deferring to state classifications for making site specific decisions but rejected this approach for the following reasons: (1) approaches to ground water classifications differ among the states; (2) EPA is seeking to promote consistency; and (3) some state classification schemes include factors (such as the PRPs' ability to pay) which EPA can not legally consider in making ground water decisions.

a. Eight Factor Analysis

The "Use and Value Determination" requires consideration of the following eight factors:

1. Quantity;
2. Quality ;
3. Current Public Water Supply Systems (PWSS);
4. Current Private Drinking Water Supply Wells;
5. Likelihood and Identification of Future Drinking Water Use;
6. Other Current or Reasonable Expected Ground Water Uses(s) in Review Area;
7. Ecological Value; and
8. Public Opinion (of use and value of ground water).

Information contained within the analysis will be supported to the extent practicable by pre-remedial and remedial investigations, and supplemented, as needed, to form the basis of determining the use and value of the on-site[3] ground water.

It should be noted that the Use and Value Determination calls for a consideration of public opinion on the use and value of the aquifer. In considering public opinion, the Use and Value Determination may require evaluation of local water resource planning, contingency planning for public drinking water supplies, and feedback received from the public on the use and value of on-site ground water.

b. Concept of Review Area

In making a Use and Value Determination, EPA anticipates that States will consider resources in a larger area than simply the area within the boundary of the Superfund site. Therefore, the Approach calls for the Use and Value determination to be made within a "Review Area." The Review Area is defined as a delineated area based initially on a two-mile radius from the boundary of the facility or area of contamination. The dimensions of the Review Area are flexible, and can be expanded or reduced based on the hydrogeologic setting or other appropriate factors. EPA

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[3]The term "on-site" as used in this guidance refers to groundwater that is contaminated or threatened by the CERCLA release being addressed.

believes that it is important to include the concept of a broad Review Area because the current area of contamination is not necessarily static, and may be affected by future stresses outside of the contaminated area (e.g., the installation of pumping wells).

c. Sources and Types of Information Considered

Appendix A identifies the above-listed eight factors, and other information to consider in evaluating these factors on a site-specific basis, and provides a list of sources to consult in gathering the necessary information. This appendix also specifies the sources and types of information that may be considered in evaluating the use and value of the ground water, including, but not limited to:

- Nature and extent of contamination (RI Report);
- Productivity and yield of aquifer (RI/State/USGS Reports);
- Locations/types of Wellhead Protection Areas (State/Local);
- Current and projected threatening land uses (State/Local);
- Zoning for land/ground water use (State/Local); and
- Sensitive resources supported by on-site ground water (EPA/USFW/State).

Appendix B provides examples for each of the eight use and value factors. These examples are not intended to direct future site-specific decision-making, but may be used as flexible guidelines for deciding whether each of the above factors should be described as high, medium or low. Appendix C includes a definition section and a list of categories of potential sources of ground water contamination.

d. High, Medium and Low Use and Value Aquifers

Overall, the purpose of the Use and Value Determination is to identify whether the aquifer at the site should be considered a "high," "medium," or "low" use and value aquifer. This bottom line description of the on-site ground water will be determined by the state, based on the balancing of the eight factors. Upon agreement by EPA, this determination will be considered when setting the remedial objectives and selecting the remedial action, as further described below. It is not EPA's intention that the HIGH, MEDIUM, and LOW results should be applied mechanically to direct a particular remedial outcome. Instead, the results of the use and value determination should be used as a management tool to assist decision makers in determining an appropriate remedy for the site.

3. Application of Use and Value Determination

a. Timing within the CERCLA Process

A draft Use and Value Determination shall be prepared as early as possible during the scoping of the RI/FS to support effective data gathering. A revised Use and Value Determination shall be prepared after the Remedial Investigation data has been obtained, to be used as a management tool in the remedial action development and selection, as described below.

To the extent practicable, the State, EPA and the PRPs should work together to ensure that pre-remedial and remedial studies are designed to collect information which should be considered in the final use and value determination, but which is not already available to the State. In particular, data gathering may include: 1) locations/types of Wellhead Protection Areas and alternate water supplies; 2) aquifer productivity; 3) the existence of potential sources of contamination in the Review Area; and 4) current or expected non-drinking water use of ground water. As necessary, other studies may supplement the information derived from remedial investigations to adequately determine ground water use and value. Such supplemental efforts may include: 1) status and description of approved Wellhead Protection Programs; 2) contingency planning for identified public water supply wells; 3) quality and quantity of raw and source water from Public Water Supply Systems; and 4) Critical Resource Areas threatened by site contamination.

b. Relationship to the Risk Assessment

In performing the Human Health Risk Assessment for the site, exposure scenarios will generally[4] be based on the generally allowed uses under the state ground water classification system. Risk assessors should not vary their existing risk assessment procedures as a result of this policy, other than to consider exposures based on the state classification rather than the 1986 draft federal guidelines.[5]

The Use and Value Determination prepared by the States may be discussed as part of the exposure assessment section of the Risk Assessment. In other words, the Use and Value Determination may be used to place the exposure scenarios in perspective.

c. Relationship to the Feasibility Study

In the Feasibility Study, EPA shall incorporate the information and evaluation provided in the Use and Value Determination in developing Remedial Action Objectives, identifying applicable, relevant or appropriate requirements (ARARS), and evaluating Remedial Action Alternatives for ground water cleanup.

Remedial Action Objectives

Where the Use and Value Determination supports a high or a medium use and value for the

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[4]Because EPA is the agency responsible for selecting the remedial action, EPA will reserve the ability to depart from the state classification scheme under certain circumstances, as explained in section IV.B.5. below.

[5]Due to the greater reliance under this policy on state classifications in assessing risk (and therefore in establishing the trigger for remedial action under the NCP), states must carefully coordinate with EPA and State Remedial Project Managers before reclassifying groundwater underlying a CERCLA site. Coordination is necessary because in some circumstances state reclassification could preclude the use of enforceable institutional controls, such as restrictions on use of the aquifer for drinking water, as part of the CERCLA remedy.

ground water ("High" and "Medium Use and Value Aquifers"), the ground water Remedial Action Objectives generally will include the restoration of contaminated ground water to drinking water standards, within a time frame that is reasonable given the particular circumstances of the site. On the other hand, where the Use and Value Determination supports a low use and value for the ground water ("Low Use and Value Aquifers"), the ground water Remedial Action Objectives generally will include prevention of exposure to contaminated ground water and prevention of further migration, but generally will not include a goal of restoration.[6]

Applicable or Relevant and Appropriate Requirements

For High and Medium Use and Value Aquifers, remediation levels generally will be set at maximum contaminant levels and non-zero MCLGs. However, for Low Use and Value Aquifers, drinking water standards generally will not be ARARs, because of the low likelihood that such aquifers will be used for drinking water in the foreseeable future.

Remedial Action Alternatives and Remedy Selection

In developing ground water remedial alternatives for High and Medium Use and Value Aquifers, EPA will consider alternatives with different restoration time periods and methodologies that attain site-specific remediation levels. The most appropriate time period for restoration will be determined through an analysis of the remedial alternatives. For example, restoration time periods may be determined by considering such factors as: hydrogeological conditions, specific contaminants at a site, the size of the contaminant plume, whether the aquifer is one of High or Medium Use and Value, and whether institutional controls would reliably prevent ground water use until restoration is achieved.

Generally, rapid restoration is favored for High Use and Value Aquifers. A more flexible approach, such as restoration of only a portion of the plume and/or use of more extended restoration time periods, may be appropriate for Medium Use and Value Aquifers. Different restoration time frames and methodologies to achieve restoration goals will be analyzed in the Feasibility Study.

For Low Use and Value Aquifers, containment alternatives will be pursued given site-specific factors including: 1) potential migration to drinking water supplies and other sensitive resources; 2) anti-degradation considerations; and 3) further risk reduction.

After considering different remedial alternatives which have been tailored to reflect the use and value of the aquifer, EPA will select the Remedial Action by balancing the factors listed in the NCP for remedial decision making.

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[6]EPA-New England emphasizes that the rankings of high, medium and low are relative marks, and are to used only as a tool for setting priorities and making decisions about remedial actions. These rankings should not be considered the definitive statement on the worth of an aquifer. It is of course possible that some aquifers, although ranked "low," may ultimately attain drinking water standards in a longer time frame through natural attenuation.

4. Coordination With the Implementation of EPA's Land Use Directive

EPA's Remedial Project Manager (RPM) should coordinate the development of the Use and Value Determination regarding the Site's ground water with the information gathering requirements and other considerations provided in EPA's directive "Land Use in the CERCLA Remedy Selection Process," OSWER Dir. No. 9355.7-04 (March 25, 1995) ("Land Use Guidance").

At Sites where soil contamination is impacting ground water, the source control remedial action objectives and alternatives to be considered under the Land Use Guidance will greatly depend on a coordinated evaluation of the ground water remedial action objectives and alternatives developed based on the Use and Value Determination. Thus, by coordinating the implementation of both the Land Use Guidance and this Ground Water Use and Value Determination Guidance, EPA-New England will select remedial action objectives and evaluate a range of alternatives based on a comprehensive consideration of the future uses of both the Site property and the Site ground water.

5. Federal and State Roles

As stated above, this guidance will be implemented in states with EPA-endorsed Comprehensive State Ground Water Protection Programs. EPA-New England will meet with each state to discuss state-specific implementation of this guidance. In general, EPA will propose that the states follow the procedures as described below. However, EPA recognizes that these procedures may need to be modified to account for state-specific differences. After reaching an agreement on the details of state-specific implementation, EPA and the state will enter into a memorandum of agreement, either as part of the state's core CSGWPP or as part of their multi-year agreement, for future implementation of this guidance in that state.

The state shall take lead responsibility for gathering the necessary information for, and completing, the Use and Value Determination. It is anticipated that the EPA RPM and other appropriate staff will work together with the state (e.g., the state RPM, state ground water program personnel, and other appropriate state personnel) in completing the Use and Value Determination.

As stated in Section IV.B.3.a. above, after the Remedial Investigation data has been collected, the State shall prepare a revised Use and Value Determination. At that time, the State shall also provide its general conclusions and recommendation as to whether all or part of the contaminated aquifer should be considered to be a High, Medium, or Low Use and Value Aquifer, based on the considerations presented in the Use and Value Determination and their recommendation on the appropriate restoration time frame. It is anticipated the state's general conclusions and recommendation on use and value shall be signed by the state's Commissioner of Environmental Protection.

Since EPA must select remedies that are protective of human health and the environment, and which comply with CERCLA and the NCP, EPA will reserve the ability to depart from a state's determination regarding use and value of ground water at a Superfund site (and/or from the state

classification scheme), under the following circumstances: (1) if EPA believes that the state has considered inappropriate factors (e.g. cost of restoration of the ground water, or whether restoration is technically practicable)[7] in making a use and value determination; (2) if the state has considered erroneous information (e.g., insupportable technical assumptions) in making such a determination; (3) if the state takes an inconsistent approach or does not apply the Use and Value criteria in a consistent manner across sites; (4) if interstate resources may be affected (e.g. an aquifer straddles state boundaries, or an aquifer affects interstate/tribal surface water); and (5) if following the state determination would result in selection of a remedy that EPA considers not to be protective of human health and the environment, or not in compliance with the CERCLA and the NCP. Finally, if the state does not provide the use and value determination in a timely fashion, or indicates that it does not plan to submit the use and value determination, EPA will take lead responsibility for completing the Use and Value Determination.

Upon agreement with the State's Use and Value Determination, and general conclusions and recommendation, EPA shall establish a ground water remediation approach that reflects the state's site-specific resource determination. EPA intends to take a general approach of deference to a state's determination, if the state determination is based on the eight use and value factors listed in this guidance, or similar approaches agreed to in the EPA-State Memorandum of Agreement.

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[7]Issues of cost of ground water restoration, or whether it is technically practicable to restore the ground water, are relevant to the preparation of the Feasibility Study and to remedy selection. However, these issues are not relevant to determining an aquifer's use and value and should not be included in the analysis.

APPENDIX A
SUMMARY OF GROUND WATER SITE-SPECIFIC USE AND VALUE CONSIDERATIONS

FACTORS	HIGH	MEDIUM	LOW	COMMENTS
1. QUANTITY				
2. QUALITY				
3. CURRENT PUBLIC WATER SUPPLY SYSTEMS (PWSSS)				
4. CURRENT PRIVATE DRINKING WATER SUPPLY WELLS				
5. LIKELIHOOD AND IDENTIFICATION OF FUTURE DRINKING WATER USE				
6. OTHER CURRENT OR REASONABLE EXPECTED GROUND WATER USE(S) IN REVIEW AREA				
7. ECOLOGICAL VALUE				
8. PUBLIC OPINION				

APPENDIX A
GROUND WATER USE AND VALUE CONSIDERATIONS

FACTORS	INFORMATION TO CONSIDER	SOURCES OF INFORMATION
1. QUANTITY	A. Type and Thickness of Hydrogeologic Units within the Review Area; B. Productivity and Relative Yield of Aquifer(s); C. Aquifer(s) Boundaries, both vertical and horizontal; D. Description of unconsolidated materials, including soil characteristics.	• State GW Classifications and CSGWPPs • Groundwater Favorability or Stratified Drift Maps • Topographic Maps • USGS/State Reports • State Well Completion Reports (e.g. Well Logs) • Water Supplier Well Discharge Records • EPA/State Pre-remedial or Remedial Investigations • Community Local Aquifer Studies
2. QUALITY	A. Nature, magnitude and extent of ground water contamination; B. Comparison of contaminant concentrations with drinking water standards; C. Estimates of relative speed and direction of plume movement within the aquifer; D. Magnitude and extent of trace contaminants naturally occurring or due to anthropogenic activities (e.g. Lead, Arsenic, Manganese, Iron).	• State GW Classifications and CSGWPPs • EPA/State Pre-Remedial or Remedial Investigations • Risk Assessment • USGS/State GW Reports • Groundwater Favorability or Stratified Drift Maps

APPENDIX A
GROUND WATER USE AND VALUE CONSIDERATIONS

FACTORS	INFORMATION TO CONSIDER	SOURCES OF INFORMATION
3. CURRENT PUBLIC WATER SUPPLY SYSTEMS	A. Numbers/types of Community or Non-Community Public Water Supply Systems (PWSSs) in Review Area; Locations and types of Wellhead Protection Areas (WHPAs) and/or surface supply drainage areas; B. Population served by PWSSs; C. Types of geologic units tapped by wells; D. Inventory of potential contaminant threats within Recharge Areas to drinking water supplies; Likelihood that current drinking water supplies may become contaminated by site under review or from other sources; E. Quality and Quantity of untreated water pumped by PWSS - estimated source(s) of contaminants, current pumping rates and future needs; F. Description and Effectiveness of Implemented Drinking Water Protection Measures - State approved local Wellhead Protection Programs (WHPPs); Implemented regulatory (e.g. zoning restrictions, easements) and/or non-regulatory measures (e.g. public education); G. Location of nearest replacement public water supply source, and economic and technical feasibility of accessing such sources if current PWSSs become contaminated.	• State GW Classifications and CSGWPPs • State or Local Health Department files • EPA/State Drinking Water System Monitoring Data Base • EPA/State Ground Water/Drinking Water Programs: Source Water Protection Plans, Sanitary Survey Results • Regional and Local Planning Officials • Public Water Supply System Operators • General Public

APPENDIX A
GROUND WATER USE AND VALUE CONSIDERATIONS

FACTORS	INFORMATION TO CONSIDER	SOURCES OF INFORMATION
4. CURRENT PRIVATE DRINKING WATER SUPPLY WELLS/SPRINGS	A. Numbers of households and Population served by private drinking water supply wells or springs; B. Hydrogeologic Background - Depth of wells; Type of wells; Geologic media; C. Vulnerability of private water supplies to Potential Contaminant Threats (site and non-site-related) - Inventory of potential contaminant threats within the well's Recharge Area (septic systems, underground storage tanks); Proximity of current and projected contaminant plume to locations of recharge areas (WHPAs) of the private water supplies; Likelihood that private water supplies may become contaminated; D. Quality and Quantity of Drinking Water Sources - Detection of natural (iron/manganese) and anthropogenic contaminants (site contaminants of concern); Average pumping rate; Current and projected future yield; E. Location of nearest alternate drinking water sources and economic and technical feasibility of accessing such sources if private drinking water supplies become contaminated.	• State GW Classifications and CSGWPPs • State or Local Health Agents • EPA/State Ground Water/Drinking Water Programs • Regional and Local Planning Officials • General Public • Public/Private Well Owners • Local Well Drillers/Pump Installers

APPENDIX A
GROUND WATER USE AND VALUE CONSIDERATIONS

FACTORS	INFORMATION TO CONSIDER	SOURCES OF INFORMATION
5. LIKELIHOOD AND IDENTIFICATION OF FUTURE DRINKING WATER USE	A. Projected Population and Industrial Growth in Review Area; B. Demand vs. Capacity. Comparison of existing water supply capacity vs. projected future growth and timeframe (e.g. need for additional 100 GPD supply in 10 years); C. Future Need. Based on Contingency and Resource planning, likelihood that GW at the Site shall be needed as a future drinking water source; D. Future supply sources. Locations of aquifers (e.g. high yield), surface water reservoirs or other water sources within the Review Area identified as future drinking water supplies; Proximity of current and projected contaminant plume to future water supplies; Current and projected threatening land use activities surrounding designated future supplies; Quality, yield, vulnerability of and projected protection measures for such alternate water supplies; Availability, and economic and technical feasibility of providing water from alternate sources (beyond current supplies) in cases that on-site groundwater is not restored as a drinking water supply within reasonable timeframe.	• State GW Classifications and CSGWPPs • State Ground Water/Drinking Water Programs • Regional and Local Planning Officials (e.g. Water Districts) • Public Water Supply Systems • General Public

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GROUND WATER USE AND VALUE CONSIDERATIONS

FACTORS	INFORMATION TO CONSIDER	SOURCES OF INFORMATION
6. OTHER CURRENT OR REASONABLY EXPECTED GROUND WATER USE(S) IN REVIEW AREA	A. Zoning for land/ground water uses within the Review Area; B. Agricultural (crop irrigation, livestock), industrial (cooling water), or commercial current or reasonably expected uses and associated quantities of such uses within the Review Area.	• State GW Classifications and CSGWPPs • Federal Agencies (USGS, SCS) • State Agricultural Agencies • State Ground Water Programs • Regional and Local Planning Officials • Public Water Supply Systems • Industrial/Commercial Owners or Operators • General Public
7. ECOLOGICAL VALUE	A. Degree of Ground Water/Surface Water Interconnections. Identification of volumes and known or projected points of entry to surface water, including wetlands or other sensitive ecosystems; B. Beneficial uses and quality of surface waters or other natural resources integrally supported by ground water; C. Extent and scope of sensitive ecological systems (e.g. critical species or unique habitat) currently or potentially adversely impacted by contaminated ground water.	• EPA SEAT TEAM • Site-Specific Ecological Risk Assessment • Federal Agencies (USFWS, USGS, NOAA) • State GW Classifications and CSGWPPs • State Surface Water Classification Maps and 305(B) Reports • EPA/State Wetlands Programs • EPA/State Coastal Programs • Conservation Commissions • Natural Heritage Program

APPENDIX A
GROUND WATER USE AND VALUE CONSIDERATIONS

FACTORS	INFORMATION TO CONSIDER	SOURCES OF INFORMATION
8. PUBLIC OPINION	A. Public awareness and feedback on GW "use" and "value"; B. Public perception and fears about contaminated GW; C. Public input on relative need to clean up the ground water; D. Community's fears about relative potential for adverse impacts on surrounding uses of property, ground water and connected surface water.	• Census Data • Newspaper Articles • Community Relations Plan • Public Meeting Notes • Regional and Local Planning Officials

APPENDIX B
EXAMPLES OF GROUND WATER SITE-SPECIFIC USE AND VALUE CONSIDERATIONS

FACTORS	HIGH	MEDIUM	LOW
1. QUANTITY[1]	1. Aquifer(s) in Review Area designated as "High Yield" by State or USGS; 2. Aquifer(s) Yield in Review Area > 300 gal/min, or Transmissivity > 4,000 feet squared/day; and 3. Above Aquifer(s) threatened[2] by on-site contaminants.	1. Aquifer(s) in Review Area designated as "Medium Yield" by State or USGS; 2. Aquifer(s) Yield in Review Area between 100-300 gal/min, or Transmissivity between 1400-4000 feet squared/day; 3. Above Aquifer(s) threatened by on-site contaminants.	1. Aquifer(s) in Review Area designated as "Low Yield" by State or USGS; 2. Aquifer(s) Yield in Review Area < 100 gal/min, or Transmissivity < 1400 feet squared/day; and 3. On-site GW plume not projected to threaten Productive Aquifer(s).

[1]If an aquifer is subject to widespread contamination or a massive degree of contamination, these facts may be considered in the assessment of quantity of water available in an aquifer, or in the quality of the aquifer. However, the fact that the CERCLA site itself has contaminated ground water generally does not, taken by itself, support ranking the quality or quantity of the aquifer as low.

[2]Threatened means current or future contaminant concentrations shall require wellhead treatment.

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EXAMPLES OF GROUND WATER SITE-SPECIFIC USE AND VALUE CONSIDERATIONS

FACTORS	HIGH	MEDIUM	LOW
2. QUALITY[3]	1. Aquifer(s) in Review Area considered drinking water quality; and 2. Limited existence of potential sources (non-site) of ground water contamination in Review Area; and 3. These High Quality Aquifer(s) threatened by on-site contaminants.	1. Aquifer(s) in Review Area contains background pollutants that can be removed by available PWSS treatment methods; 2. Some existence of high risk land use activities (non-site) identified within High Quality Aquifer; and 3. Above Aquifer(s) threatened by on-site contaminants.	1. Aquifer(s) in Review Area contains Total Dissolved Solids > 10,000 ppm; 2. Aquifer(s) contaminated by naturally occurring substances or widescale human activity beyond PWSS treatment capabilities; 3. On-site GW plume not projected to threaten High or Medium Quality Aquifer(s).

[3]If an aquifer is subject to widespread contamination or a massive degree of contamination, these facts may be considered in the assessment of quantity of water available in an aquifer, or in the quality of the aquifer. However, the fact that the CERCLA site itself has contaminated ground water generally does not, taken by itself, support ranking the quality or quantity of the aquifer as low.

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EXAMPLES OF GROUND WATER SITE-SPECIFIC USE AND VALUE CONSIDERATIONS

FACTORS	HIGH	MEDIUM	LOW
3. CURRENT PUBLIC WATER SUPPLY SYSTEMS (PWSS)	1. Current PWSS(s) require wellhead treatment due to on-site contaminants; 2. PWSS(s), Wellhead Protection Area(s) or Sole Source Aquifer(s) identified within Review Area have water supply sources threatened by on-site GW contamination; 3. Alternate water supplies not economically[4] nor technically feasible if current public supply sources become contaminated.	1. PWSSs, Wellhead Protection Areas or Sole Source Aquifers identified within Review Area but on-site GW contamination not projected to threaten such water supplies; 2. Complex hydrogeological setting; long term monitoring needed to establish on-and off-site GW contaminant fate and transport.	No Public Water Supply Systems, Wellhead Protection Areas or Sole Source Aquifers identified in Review Area.

[4]According to the Sole Source Aquifer Designation Guidance, use of potential sources of drinking water can be considered to be economically infeasible if the annual system cost to a typical user exceeds 0.4 to 0.6% of the mean household income in the area.

APPENDIX B
EXAMPLES OF GROUND WATER SITE-SPECIFIC USE AND VALUE CONSIDERATIONS

FACTORS	HIGH	MEDIUM	LOW
4. CURRENT PRIVATE DRINKING WATER SUPPLY WELLS	1. Private well(s) require wellhead treatment due to on-site contaminants. 2. Identified private well(s) in Review Areas threatened by on-site contamination; 3. Alternate water supplies are not economically nor technically feasible if current private wells become contaminated.	1. Based on hydro- geological studies, identified private water supply wells not threatened by site-related GW contaminants; 2. Complex hydro- geological setting; long-term monitoring needed to establish on-and off-site GW contam- inant fate and transport.	1. No private drinking water supply wells identified in Review Area; 2. Private supply wells unlikely because area substantially serviced by PWSSs.

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EXAMPLES OF GROUND WATER SITE-SPECIFIC USE AND VALUE CONSIDERATIONS

FACTORS	HIGH	MEDIUM	LOW
5. LIKELIHOOD AND IDENTIFICA-TION OF FUTURE DRINKING WATER USE	1. Future drinking water sources in Review Area threatened by site contaminants; 2. Existing water supply capacity in Review Area shall not meet projected future demand if on-site GW not restored; 3. Vulnerable PWSSs not implementing local WHPPs and if contaminated, delivery of comparable GW quality & quantity from alternate sources infeasible.	1. Current WHPAs or designated future water supply protection areas within Review Area not threatened by site contamination but land use activities surrounding such supplies include potential sources of contamination; 2. Uncertain whether on-site ground water may be needed as a future water supply source.	1. Existing water supply capacity far exceeds future needs, exclusive of on-site GW restoration; 2. Future high valued water sources (e.g. high yield aquifers) within Review Area not threatened by site contamination or other potential sources of contamination.
6. OTHER CURRENT OR REASONABLY EXPECTED GROUND WATER USE(S) IN REVIEW AREA	Current or reasonably expected agricultural, commercial or industrial use of GW in Review Area threatened by site contamination.	Projected uses of GW in Review Area include agricultural, commercial or other beneficial uses, but such uses not threatened by site contamination, and adequately planned for, not including use of on-site GW.	No current or projected uses of ground water identified in Review Area (exclusive of drinking water).

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EXAMPLES OF GROUND WATER SITE-SPECIFIC USE AND VALUE CONSIDERATIONS

FACTORS	HIGH	MEDIUM	LOW
7. ECOLOGICAL VALUE	On-site GW provides principal hydrologic support for wetlands, surface water reaches, or other sensitive ecosystem(s), and contaminants potentially pose a risk to ecological receptors.	On-site GW contributes a component of hydrologic support for wetlands, surface water, or other sensitive ecosystem(s), or contaminants potentially pose a risk to ecological receptors.	No measurable GW/SW/wetlands interconnections documented on-site or potentially affected off-site.
8. PUBLIC OPINION	1. Substantial public opinion expressing the high value placed on ground water on-site or in the Review Area; 2. Public concerned with the need to use on-site GW as a future water supply source, or the potential for on-site contamination to threaten current or future water supplies.	1. Minimal feedback received from the public identifying the high, medium or low "use" and "value" of ground water; 2. Low to moderate public concern about future use and value of on-site ground water.	1. Substantial public feedback opposed to the use of on-site GW even if restored; 2. Public places minimal value for on-site ground water use; and 3. Public provides water resource planning documentation which describes adequate alternate and feasible uses of GW in Review Area, exclusive of on-site GW.

APPENDIX C

DEFINITIONS

1. AQUIFER
A geologic formation, group of formations, or part of a formation capable of yielding useable quantities of ground water to wells or springs. An aquifer may be deemed "significant" if it provides sufficient quantities of water to satisfy large water use demands.

2. COMMUNITY WATER SYSTEM
A public water supply system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

3. COMPARABLE QUALITY
The quality of the raw sources of drinking water used in the Review Area, considering, in a general way, both the types of contaminants that are present and their relative concentrations.

4. COMPARABLE QUANTITY
An alternative source capable of reliably supplying water in quantities sufficient to meet the current year-round needs of the review area that is served by ground water. In determining sufficient needs, population growth and increasing water needs over time may be considered.

5. GROUND WATER RESERVOIRS
Stratified drift deposits having a saturated thickness greater than or equal to 40 feet and a transmissivity greater than or equal to 4000 feet squared per day which have been designated to be potentially significant sources of water. Locations of significant fractured bedrock may also be considered ground water reservoirs.

6. LAND USE ACTIVITIES
Residential, municipal, commercial, industrial, agricultural and natural activities occurring on the land surface. Each New England State Wellhead Protection Program provides guidance on the types of land use activities that should be inventoried as potential sources of contamination to ground water (see Table 1).

7. LOCAL WELLHEAD PROTECTION PROGRAM
Program developed in accordance with approved State Wellhead Protection Program requirements which describes background information on the recharge area to a public water supply well and outlines management measures to protect such drinking water supplies. Components of a local program depend upon State requirements and may include: Wellhead Protection Area delineation, inventory of potential sources of contamination, identification of local planning team, list of management measures and contingency planning.

8. PUBLIC WATER SUPPLY SYSTEM
A system to supply the public with piped water for human consumption, having at least fifteen (15) service connections or regularly serving an average of at least twenty-five (25) individuals daily at least sixty (60) days out of the year. A system includes all sources and facilities involved in collecting, treating, storing and distributing the water.

9. RECHARGE AREA
The land surface area which receives precipitation recharge that will move to the well naturally or under pumping conditions.

10. REVIEW AREA
Delineated area based initially on a two-mile radius from the boundaries of the facility or contamination area. The dimensions of the Review Area can be expanded or reduced based on hydrogeologic settings. This Review Area shall be larger than the "site" boundaries in order to depict a broader view of ground water assessment and uses. The current area of contamination is not necessarily static and may be affected by future stresses outside the contaminated area (e.g. installation of pumping wells).

11. SATURATED THICKNESS
The thickness of an aquifer measured from the water table to an essentially impermeable boundary; such boundary is typically taken to be the top of the bedrock surface.

12. SENSITIVE ECOLOGICAL SYSTEM
An aquatic or terrestrial ecosystem located in a ground water discharge area and supporting a unique habitat (i.e. habitat for a listed or proposed endangered or threatened species, or land management areas specifically designated and managed for the purpose of ecological protection).

13. SOLE SOURCE AQUIFER
An aquifer petitioned by local communities and designated by the United States Environmental Protection Agency, which is needed to supply 50% or more of the drinking water for that area and for which there are no reasonably available alternative sources should the aquifer become polluted.

14. TRANSMISSIVITY
A measure of the ability of an aquifer to transmit water. It can be quantified by multiplying the hydraulic conductivity by the saturated thickness.

15. WELLHEAD PROTECTION AREA (WHPA)
A three dimensional land surface and subsurface zone surrounding a public water supply well or wellfield which encompasses the volume of materials through which water will move to the well(s).

APPENDIX C

LIST OF CATEGORIES OF POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION[1]

Higher Risk

Airports-Commercial (maintenance & repair, fuel storage)
Automotive Repair Shops
Automotive Body Shop
Boat Builders & Refinishers
Bus & Truck Terminals
Chemical Manufacturers
Dry Cleaners
Fuel Oil Distributors (product storage, equipment maintenance & storage)
Furniture Strippers, Refinishers
Industrial Manufactures
Junkyards and Salvage Yards
Landfills & Dumps
Machine Shops
Metal & Drum Cleaning/Reconditioning
Paint Shops
Photographic Processors
Printers and Blueprint Shops
Railroad Yards
Repair Shops (engines, appliances, etc.)
Rust Proofers
Service Stations (gas stations)
Waste Storage, Treatment & Recycling (hazardous and non-hazardous)

Moderate Risk

Agriculture Related Activities (pesticide & fertilizer storage & application, machinery maitenance & fueling)
Asphalt, Coal, Tar & Concrete Companies
Dredge Disposal Sites
Medical Facilities (hospitals, clinics laboratories)
Military Facilities (past & present)
Nursing Homes
Pipeline (oil & sewers)
Prisons
Research Laboratories
Road Salt Storage
Schools, Colleges, Trade Centers
Wastewater Treatment Plants (past or present sludge disposal)
Wood Preservers

Lower Risk

Animal Care & Holding Areas (stables kennels, pet shops)
Auto Parts Stores
Beauty Salons
Construction Sites
Food Processors (meat packers, dairies, bakeries)
Funeral Homes & Cemeteries
Golf Courses
Hotels & Motels
Land Applciation of Sewage Sludge
Laundromats
Nurseries
Residential Development (lawn care, spetic systems)
Restaurants & Taverns
Retail Shopping Centers, Malls
Sand & Gravel Mining Operations
Sawmills
Stormwater Management Facilities (leaching systems)
Transmission Line Rights of Way
Transporation Corridors (road deicing, materials transport)

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[1]From Wellhead Protection Inventory Guidance